5.7 Rational Exponents

- write expressions with rational exponents in radical form and vice versa
- simplify

For all
$b \in R$
$n \in Z$

$$\sqrt[n]{b} = b^{\frac{1}{n}}$$

Exponential Form	Radical Form
$8^{1/3}$	$\sqrt[3]{8} = 2$
$64^{1/2}$	$\sqrt{64} = 8$
$16^{1/4}$	$\sqrt[4]{16} = 2$
$x^{1/5}$	$\sqrt[5]{x}$
$x^{3/4}$	$\sqrt[4]{x^3}$

$$b^{\frac{m}{n}} = \sqrt[n]{b^m}$$

$$\left(\sqrt[n]{b}\right)^m$$

For all $b \in R$ ($b \neq 0$) and $m, n \in Z$ ($n > 1$)

Simplified
- no negative exponents
- no fractional exponents in denominator
- not a complex fraction
- index is as low as it can be

Simplify.

$\sqrt[4]{36x^2}$

$(6^2x^2)^{1/4}$

$6^{2/4}x^{2/4}$

$6^{1/2}x^{1/2}$

$\sqrt{6x}$

$\sqrt{\sqrt{36x^2}}$

$\sqrt{6x}$

Simplify.

$\sqrt[8]{16}$

$2^{4/8}$

$2^{1/2}$

$\sqrt{2}$

Simplify.

$\sqrt[15]{32}$

2^5

$2^{5/15}$

$2^{1/3}$

$\sqrt[3]{2}$

$\sqrt[3]{x^2} \cdot \sqrt{x}$

$$x^{\frac{2}{3}} \cdot x^{\frac{1}{2}}$$

$x^{\frac{4+3}{6}}$

$x^{7/6}$

$\sqrt[6]{x^7} = x\sqrt[6]{x}$

$\sqrt[6]{x^6} = x$

$x^{6/6}$

x^1

$$\sqrt[12]{9x^6}$$

$(3^2 x^6)^{1/12}$

$3^{2/12} \quad x^{6/12}$

$3^{1/6} \quad x^{3/6}$

$\sqrt[6]{3x^3}$

$$\frac{\sqrt[8]{16}}{\sqrt[6]{2}}$$

$\frac{2^{4/8}}{2^{1/6}} = \frac{2^{\cancel{1/2}\, 3/6}}{2^{1/6}} = 2^{2/6}$

$2^{1/3}$

$\sqrt[3]{2}$

$$9^{-\frac{1}{2}} = \frac{1}{3}$$

$\frac{1}{9^{1/2}}$

$$\frac{3}{y^{\frac{1}{2}}} \cdot \frac{y^{\frac{1}{2}}}{y^{\frac{1}{2}}} = \frac{3\sqrt{y}}{y}$$

$$\frac{3}{\sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}}$$

$$\boxed{\frac{3\sqrt{y}}{y}}$$

HW
p261
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